

ORIGINAL ARTICLES

Description of a Chronic Heart Failure Service Model and Review of Pharmacotherapy in a District General Hospital in Comparison to Scottish Intercollegiate Guideline Network (SIGN) Guidelines.

OA Ogundipe¹, J Cordina², CA Norris MBE³

¹Specialist Registrar, Department of Medicine for the Elderly, Borders General Hospital, Melrose, Roxburghshire, TD6 9BS.

²Consultant Physician, Department of Medicine for the Elderly, Victoria Hospital, Hayfield Road, Kirkcaldy, KY2 5AH.

³Formerly Consultant Physician, Department of Medicine for the Elderly, Borders General Hospital, Melrose, Roxburghshire, TD6 9BS.

Correspondence to

Dr Olayinka A. Ogundipe, Consultant Physician, Department of Medicine of the Elderly, Royal Infirmary of Edinburgh, 51 Little France Crescent, Old Dalkeith Road, Edinburgh EH16 4SA.
Email: ola_ayodele@hotmail.com

Abstract

Background

The Scottish Intercollegiate Guidelines Network (SIGN) guideline 95 on the management of chronic heart failure (CHF) was published in February 2007, superseding SIGN guideline 35 of February 1999. The guideline promotes evidence based management of CHF.

Aims

To describe an existing service model and to review our level of concordance with SIGN guidelines.

Methods

We describe a model of a CHF service based in a district general hospital (DGH) in Scotland. We conducted a retrospective review on consecutive new referrals between August and November 2002, and a prospective review of new attendances between September 2005 and January 2006.

Results

In 2002 and 2005/6, 49 and 45 patients were reviewed respectively, with 26 and 28 patients showing left ventricular systolic dysfunction on echocardiography. Median ages of patients were 81 and 79 years respectively. Angiotensin Converting Enzyme Inhibitor (ACEI) or Angiotensin II Receptor Blocker (AIIIRB) therapy was in use in 23 (88.5%) and 24 (85.7%) patients respectively. The use of β -blockers, digoxin and spironolactone was shown to have improved between both reviews.

Conclusions

We have been able to demonstrate an improving level of concordance with SIGN guidelines in a district general hospital (DGH) heart failure service model run by care of the elderly physicians and supported by specialist nurses.

Introduction

Chronic heart failure (CHF) is recognised as a significant cause of morbidity and mortality.¹ An estimated incidence in the general population of the United Kingdom (UK) is ~ one per 1000.¹ The incidence rises steeply with age, with estimates at ≥ 10 per 1000 in the above 85 age group.^{1,2,3} The Scottish Intercollegiate Guidelines Network (SIGN) published guideline number 35 on the evaluation and management of heart failure due to left ventricular systolic dysfunction (LVSD) in February 1999, promoting evidence based management and practice.¹ SIGN 35 has been superseded by SIGN guideline 95 on the management of CHF, published in February 2007.

The aim of this paper is to describe a model of a local CHF service based in a district general hospital (DGH) in Scotland and run by care of the elderly (COTE) physicians. We reviewed our concordance with pharmacotherapy, adopting recommendations in SIGN guidelines as a standard.

Methods

The Department of Medicine for the Elderly (DME) at the Borders General Hospital (BGH), Melrose serves a population of ~ 106,000 within the broad geographical area referred to as the Scottish Borders. A cardiovascular clinic (CVC) was set up in 1997 under the supervision of a consultant physician in DME with an interest in cardiology (author CAN). The CVC is based in the day hospital (an integral part of the DME), and focuses mainly on assessment and management of patients with suspected CHF and atrial fibrillation (AF). Patients with murmurs of uncertain significance are also assessed. Most of the CVC referrals are in the older age bracket (≥ 65 years but with no upper age limit). Most referrals are from primary care (in the absence of direct access to echocardiography). Separate cardiology clinics are run in the hospital by a cardiologist, attending to younger CHF patients and to the broader scope of general and subspecialty cardiology.

The CVC has two arms: one doctor-led and one specialist nurse-led, with separately run clinics, but with active liaison between the teams. Doctors run a dedicated CVC day, currently Thursday mornings. In the doctor-led arm of the CVC, up to three new patients are evaluated per clinic session, and a variable number of reviews, though this arm of the clinic strives to run mainly in a one-stop fashion. Most reviews are followed up by the specialist nurses in hospital, by home visits, and/or by

telephone consultations. Table I shows the trend of yearly attendances in both arms of the CVC.

Table I: Yearly Attendance Trends at Both the Doctor and Nurse led Cardiovascular Clinic at the Day Hospital, Borders General Hospital, Melrose.

	1997-8	1998-9	1999-2000	2000-1	2001-2	2002-3	2003-4	2004-5	2005-6
New	86	158	150	156	183	156	182	252	339
Total	164	368	387	369	287	369	287	420	577

In the doctor-led arm of the CVC, patients are evaluated and investigations performed including relevant blood work-up, electrocardiography (ECG), chest X-ray and echocardiography (ECHO) in accordance with SIGN recommendations.¹ Our laboratory does not yet offer services for measuring 'brain' natriuretic peptide (BNP) levels. By previous negotiation with the Physiological Measurement department, there are three available dedicated slots for same day transthoracic ECHOs during the clinic session. The ECHOs are performed and reported by trained professionals, with five of the current technicians having British Society of Echocardiography (BSE) accreditation. ECHO reports are generated in type-written and standardised format. A further advantage of having high quality reporting of ECHOs is that this minimises requests for second opinions from the cardiologist, thus allowing the clinics to run more efficiently and with minimum disruption to other services.

Where left ventricular systolic dysfunction (LVSD) is confirmed on ECHO, appropriate therapy is instituted/reviewed, and an outlined management plan communicated (with the patient's consent) to general practitioners (GPs) and specialist nurses. Where left ventricular diastolic dysfunction (LVDD) is identified on ECHO, and is clinically thought to be contributory to the patient's symptomatology, the limited available evidence base is considered in recommending pragmatic, and often symptom directed treatment.

Further patient and carer education, support, counselling, follow-up, supervision of day-case attendance for Angiotensin Converting Enzyme Inhibitor (ACEI)/ β -blocker therapy initiation trials and titrations, are provided mainly by two specialist nurses. Patients are discussed with, and/or reviewed by physicians as required.

In many stable cases, GPs supervise dose titrations in the community with appropriate monitoring. This might occur in local practices, at home via planned GP or district nurse visits, or as planned admissions in the many community hospitals that serve the Scottish Borders. Where GPs identify a need for specialised input, and depending on patients' needs, they are re-referred either to the doctor-led or nurse-led arm of the CVC. Suspected cases of acute/severe deterioration in heart failure are admitted directly via on-call medical takes but can be subsequently referred to the CVC for optimisation of therapy, after stabilisation and hospital discharge. Referrals originate from either admitting teams or GPs.

Patients are referred from the CVC to the local cardiologist eg significant ischaemic heart disease or valvular heart disease requiring further specialist evaluation or consideration for interventions or surgery, consideration of pacemaker systems or implantable cardioverter defibrillators for relevant arrhythmias etc. Elective direct current (DC) cardioversion for AF can be arranged by direct liaison with the Coronary Care Unit. Further specialty input (eg respiratory, haematology, palliative care) is accessed by referral from the CVC.

We can also access other services and disciplines like physiotherapy, occupational therapy, dietetics, social services, smoking cessation services, continence nurses etc who have good links with the DME and day hospital. This facilitates multi-disciplinary input to patients who often have multiple comorbidities.

We reviewed our level of concordance with pharmacotherapies recommended for LVSD using the then available SIGN 35 guideline (Table II).

Table II: Summary of SIGN Guideline 35 on Pharmacological Treatment of Left Ventricular Systolic Dysfunction. (Grade of evidence)

Consider ACE inhibitor in LVSD.* [A]

Consider β -blocker therapy in patients with stable, mild to moderately symptomatic (NYHA class I-III) heart failure with extreme caution and only under specialist care.* [A]

Consider diuretic therapy if signs of sodium and water retention. [A]

Consider low dose (25 mg, orally, once daily) spironolactone in patients with moderately severe or severely symptomatic (NYHA class III/IV) heart failure if persisting symptoms, sodium and water retention (Careful monitoring of blood chemistry is mandatory).* [A]

Consider digoxin in patients with NYHA class III/IV heart failure, in sinus rhythm, with persisting symptoms, very poor left ventricular systolic function or persisting cardiomegaly. [A]

Consider hydralazine and isosorbide dinitrate (H-ISDN) combination therapy or an angiotensin II receptor antagonist if patients are truly intolerant of an ACE inhibitor.* [A]

Consider HMG CoA reductase inhibitor (statin) therapy if coronary artery disease. [C]

* Note: indications or guidance have changed in SIGN 95.

It is to be noted that indications for use have been modified in SIGN 95.¹ A retrospective case note review was conducted on 49 consecutive new referrals between 1st August and 14th November 2002 (audit A). A prospective review was conducted on 45 consecutive new referrals between 1st September 2005 and 5th January 2006 (audit B). All new patients meeting the inclusion criteria of: 'ECHO confirmed evidence of LVSD' were included in the respective phases of the audit. We compared our documented performances in the individualised consideration of, and use of appropriate medications; auditing our performance on appropriate prescribing against the desired gold standard of 100% concordance with the then existing SIGN guideline 35. We allowed for contraindications or patient preferences that precluded prescribing of certain treatments. Where required information was lacking, we contacted the relevant general practice over the telephone. Where documentation was absent or unclear, we applied the default position of assuming the treatment option had not been considered or used.

Approvals were obtained from the Borders General Hospital (BGH) clinical audit unit. An anonymised data collection proforma was designed and audit numbers assigned to index cases. Case records were obtained from the medical records department following generation of new patient referral lists from the coding unit covering the periods reviewed.

Results

Of the cases studied, 26 out of 49 (53.1%) and 28 out of 45 (62.2%) patients were identified as having LVSD on ECHO from audits A and B respectively. The cohorts of 26 and 28 patients were reviewed, with median ages being 81 and 79 years respectively.

Angiotensin converting enzyme inhibitor (ACEI) or Angiotensin II receptor blocker (AIIIRB) therapy (at any dose) was in use in 23 (88.5%) and 24 (85.7%) patients respectively, with a target or maximum tolerated dose confirmed as being achieved in 10 (50%) and 11 (55%) respectively. For those with signs of fluid retention, diuretic therapy (usually furosemide or bumetanide) was in use in 23 (88.5%) and 26 (92.9%) patients respectively. The use of cardio-selective beta-blockers (usually bisoprolol or carvedilol) in LVSD had shown improvement from six (23%) in audit A, to 14 (50%) patients in audit B.

Seven (26.9%) and 11 (39.3%) patients were on digoxin in the two audits, while spironolactone was in use in three (11.5%) and eight (28.6%) patients respectively. Table III illustrates the trend of improving prescribing practices between the two audits. One patient who was intolerant of ACEI and AIIIRB was on treatment with the combination of isosorbide dinitrate and hydralazine in audit B. No patient was on this combination in audit A.

Table III: Numbers (%) on appropriate* Medications for LVSD in comparison to indications in SIGN 35 guideline.

	Audit 1 (2002) (2005/6)	Audit 2
ACEI or AIIIRB usage (At any dose)	23(88.5%) (85.7%)	24
ACEI or AIIIRB usage (At target or maximum tolerated dose)	10 (50%) (55%)	50
High ceiling diuretic use	23 (88.5%) (92.9%)	26
Cardio-selective beta-blockers	6 (23%)	14 (50%)
Digoxin	7 (26.9%)	11
Spironolactone	3 (11.5%) (28.6%)	8

* Note: indications or guidance have changed in SIGN 95.

A total of 15 (30.6%) and 11 (24.4%) patients were in atrial fibrillation (AF) in audit A (n = 49) and B (n = 45) respectively. The combination of AF and LVSD was noted in 10 (38.5%) and 11 (39.3%) patients respectively. In the AF subgroup, data on warfarin and/or antiplatelet therapy was incomplete for audit A. In audit B, nine (82%) patients with AF were on warfarin, with the other two (18%) on antiplatelet agents. Statin use was not reviewed in audit A, but was in use in 14 (50%) patients who had LVSD and ischaemic heart disease in audit B.

Discussion

A significant proportion of patients did not have LVSD on ECHO (46.9% and 37.8% in audits A and B respectively). This underlines the importance of access to a service to properly identify those patient groups most likely to benefit from appropriate evidence based treatments. Treatment based solely on clinical diagnoses of heart failure is often inaccurate.¹ This is particularly so in older patients with significant comorbidities who often present with symptoms and signs that can be mistaken for heart failure.^{1,3}

A significant number of patients with asymptomatic and symptomatic LVSD remain undetected in the community. This remains a worldwide problem.^{1,2,3} For known cases that benefit from medical evaluation, differences have been shown previously between cardiologists and non-cardiologists, in relation to level of awareness and its influence, on implementation of SIGN recommendations.⁴ In general, implementation of certain heart failure guidelines has been shown to be better in patients treated by cardiologists than non-cardiologists.^{5,6,7} Despite this observation, it has been previously identified that the majority of patients in the United Kingdom (UK) living with CHF will be cared for by non-cardiologists, many of whom are COTE physicians.⁴ Notwithstanding available guidelines, and the recognition that cardiologists generally performed better in practice, the implementation of evidence-based pharmacotherapies for CHF nevertheless often remains inadequate.^{5,6,7,8} Again, this is a world-wide problem with the UK not being an exception.^{1,3,4,6,8} This inadequacy of treatment has previously been demonstrated even at the level of a university hospital environment, and the possibility was described that this might reflect a lack of organisational development to facilitate the increasingly complex management of CHF patients.⁸

We postulate that in the face of personnel constraints in cardiology, and particularly at DGH level, COTE physicians with an interest in cardiology may be well positioned to coordinate the assessment and management of this important condition, and the accompanying need for organisational developments.⁹ As part of our quality assessment reviews, a survey of satisfaction based on the patient 'journey of care'¹⁰ through the CVC was conducted in 2004, and provided further useful feedback on the unit's performance. The survey conducted by sister in charge of the day hospital reviewed opinions of 80 patients attending the CVC in relation to seven simple but practical questions (Table IV). NHS Quality Improvement Scotland (NHS QIS) advocates patient feedback as a valuable asset in healthcare service delivery and development.¹⁰ A quarter of new referrals to the CVC were seen within one week, three-quarters within two weeks and all offered initial appointments within four weeks (Table IV). This access compares favourably with the much longer waiting times they could face if the cardiology service (which currently has only one full time cardiologist in post) were to take on the added role of assessing and managing all patients aged >65 years with CHF from the COTE physicians.

Table IV: Patient Satisfaction Survey in the Cardiovascular Clinic in year 2004. n = 80

1] How long did you wait for an appointment?	< 1 week 36%
	1 - 2 weeks 40%
	2 - 4 weeks 24%
2] Could you keep the first appointment date offered?	Yes 94% No 6%
3] Did you have difficulty in getting to the clinic?	Yes 92% No 8%
4] Did a member of staff greet you on arrival?	Yes 100%
5] Where you attended to promptly and courteously?	Yes 100%
6] Was the purpose of the clinic clearly explained to you?	Yes 100%
7] Have you found the clinic beneficial to your needs?	Yes 100%

COTE physicians are also well placed to perform a concurrent and comprehensive geriatric assessment (for detection of possible loss of autonomy for doing basic and instrumental activities of daily living, cognitive decline, and social risk)¹¹ and, to assess and manage medical co-morbidities^{1,12} that often coexist in these predominantly older age patients.

As part of the service development and organisational changes, the nurse-led arm of the CVC was introduced in 2003 following the first round of the audit with the aim of improving patient/carer support, counselling, education, monitoring and titration of medications. Historically in the doctor-led arm of the CVC, the consulting doctor has been the specialist registrar (SpR) in DME or the consultant. Following on from the first audit, the SpRs in DME (usually on yearly rotations through the BGH) have held an initial meeting with the supervising consultant, to outline the structure and function of the CVC, and to ensure conversance with relevant SIGN guidelines and updates in evidence base.¹³ Local and regional pharmacological preferences/availabilities are discussed to facilitate concordance with medication prescriptions across primary and secondary care.¹⁴ Copies of the full and summary versions of the SIGN guideline have been made accessible for reference in print form and on a computer in the consulting room. A CVC assessment proforma has been designed and is in use to facilitate standardisation of care. With changes arising from Modernising Medical Careers in the UK, it is envisaged that doctors in the grade of specialty registrars (ST3 and above) will consult in the clinic.

We describe this service model as an example of an innovative strategy within Scotland whereby a COTE physician with special interest in cardiology (author CAN) has taken the lead in initiating, coordinating and developing the local delivery of CHF services to the predominantly older (≥ 65 years) individuals. The availability of the day hospital premises within the DME for running the dedicated clinic, and the ready access to a team of skilled multi-disciplinary staff is worth noting. The creation of cardiac specialist nurse posts (with roles in heart failure) has played a significant part in improving standards of patient care in the areas described earlier. The specialist nurses have promoted integration and interfacing across primary and secondary care. Local GPs have been greatly supportive of the specific roles and functions of the CVC since its introduction, and the majority of referrals received are deemed appropriate. Many GPs have access to beds within community hospitals in the Scottish Borders.

The current approach facilitates community-oriented service delivery, once the initial diagnosis has been reliably confirmed by ECHO (which is still a hospital based assessment in our setting). Further extensions to this concept, in terms of developing community-based, chronic disease management strategies for Scotland, could involve more education and basic training of carers (formal and informal), and the development of local/regional services and infrastructure to support specialist nurses and GP surgeries caring for CHF patients. Potential concerns to the smooth advancement of this concept within the Scottish Borders are likely to include geographical and logistic constraints, transportation issues, financial limitations, direct GP access to evaluations like ECHO, education and training issues relating to specialist level care provision, and access to supporting specialist inputs when required.

Our model has not attained perfection but strives to provide a comprehensive service. A cardiology Managed Clinical Network (MCN) heart failure subgroup meets regularly to refine strategies for improving care to individuals living with CHF.

Emphasis is placed on providing patient-centred, timely, effective, safe, evidence-based and appropriate services that meets the needs of patients and carers. MCN subgroup membership includes representative(s) of patient or patient groups, two heart failure specialist nurses, relevant hospital manager(s), subgroup secretary, consultant cardiologist, COTE consultant with interest in cardiology and COTE registrar. More recently, the need for consistent interfacing with community social services and community palliative care was identified. In developing dependable links, it was recognised that interfacing need not translate to actual committee membership, but emphasises that link individuals should be able to empower action or follow-up on key issues.

Section 9.2 of the updated SIGN guideline 95 identifies heart failure as one of the key points for intended national standard dataset audit; proposing this as one aspect of supporting patient care. Using the practical guidance notes incorporated in annexes one to four of the updated SIGN guideline 95, it will be possible for individual services to appraise the 'pharmacological therapy for LVSD'.¹ From our service evaluations, we have demonstrated improving use of evidence-based pharmacotherapy that can reduce morbidity and/or mortality in CHF. Current use of ACEI/AIIRB (at any dose) appears good at 85–88% but it is acknowledged that there are lingering difficulties with ensuring that maximum tolerated/target doses are reached in practice, as we could only confirm documented attainment of this objective in 50–55% of the cohorts reviewed. Though recognising room for further improvement, we have shown increasing use of cardio-selective beta-blockers, digoxin and spironolactone in accordance with SIGN guidelines.

Conclusions

It is feasible for a CHF service to be run successfully by COTE physicians (with a special interest in cardiology) in a DGH setting. The current service has been running for over nine years. With active evaluation, re-organisation and redesign, we have been able to sustain continuous improvement since its inception.^{15,16,17,18} Reviews of service delivery have helped to focus on areas for ongoing and targeted development.^{15,16,17,18} This model hinges firmly on a team based approach.^{9,16,17,18} We identify that the role of specialist nurses, as well as ready access to multi-disciplinary day hospital staff enhances the successful running of the existing service.

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References

1. Scottish Intercollegiate Guidelines Network. Management of Chronic Heart Failure. Publication Number 95. Edinburgh: SIGN, 2007. Available at <http://www.sign.ac.uk> (Accessed 29th December 2007)
2. Stewart S, MacIntyre K, MacLeod MM, et al. Trends in hospitalisation for heart failure in Scotland, 1990-1996. An epidemic that has reached its peak? *Eur Heart J* 2001; 22: 209-217.
3. McDonagh TA, Morrison CE, Lawrence A, et al. Symptomatic and asymptomatic left-ventricular systolic dysfunction in an urban population. *Lancet* 1997; 350: 829-33.
4. McKee SP, Leslie SJ, LeMaitre JP, et al. Physician opinions on the implementation of the SIGN guideline for heart failure. *Scot Med J* 2004; 49: 10-13.
5. Davie AP, McMurray JJ. ACE inhibitors and heart failure in hospital: any difference between cardiologists and general physicians? *Postgrad Med J* 1999; 75: 219-22.
6. Edep ME, Shah NB, Tateo IM, et al. Differences between primary care physicians and cardiologists in management of congestive heart failure: relation to practice guidelines. *J Am Coll Cardiol* 1997; 30: 518-26.
7. Schreiber TL, Elkhatib A, Grines CL, et al. Cardiologist versus internist management of patients with unstable angina: treatment patterns and outcomes. *J Am Coll Cardiol* 1995; 26: 577-82.
8. McKee SP, Leslie SJ, LeMaitre JP, et al. Management of chronic heart failure due to systolic left ventricular dysfunction by cardiologist and non-cardiologist physicians. *Eur J Heart Fail.* 2003; 5: 549-555.
9. Erhardt LR, Cline CMJ. Organisation of the care of patients with heart failure. *The Lancet.* 1998; 352 (suppl 1): 15-18.
10. Cant B, Kohli H. A national strategy for clinical audit in Scotland. NHS Quality Improvement Scotland. Paper presented to NHS QIS Board meeting on 31 March 2005. Available at <http://www.nhshealthquality.org/nhsqis/files/Strategy%20for%20Clinical%20Audit.pdf> (Accessed 29th December 2007).
11. Altimer S, Lupon J, Gonzalez B, et al. Sex and age differences in fragility in a heart failure population. *Eur J Heart Fail.* 2005; 7: 798-802.
12. Lien CTC, Gillespie ND, Struthers AD et al. Heart failure in frail elderly patients: diagnostic difficulties, co-morbidities, polypharmacy and treatment dilemmas. *Eur J Heart Fail.* 2002; 4: 91-98.
13. Lowe G, Twaddle S. The Scottish Intercollegiate Guidelines Network (SIGN): an update. *Scot Med J* 2005; 50: 51-52
14. Murray M, Padfield PL, Maxwell SRJ. Does a hospital formulary influence prescribing practice in an acute medical admissions unit? *Scot Med J* 2005; 50: 76-79
15. Langlands A. The Health Service in a devolved Scotland. *SMJ* 2006; 51: 13-16
16. Scottish Executive. Partnership for Care. Edinburgh: Scottish Executive, 2003.
17. Scottish Executive. Building a Health Service Fit for the Future: a National Framework for Service Change in the NHS in Scotland. Edinburgh: Scottish Executive, 2005.
18. Scottish Executive. Delivering for Health. Edinburgh: Scottish Executive, 2005.